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Note: This DER was originally prepared under contract by Versar, Inc. (6850 Versar Center, Springfield, VA 22151; submitted 12/20 13). The DER has been reviewed by the Health Effects Division (HED) and revised to reflect current Office of Pesticide Programs (OPP) policies.

STUDY REPORT:

49071010 Carringer, S. (2013). Abamectin 500 FS (A14006B) and Abamectin SC (A15368D) – Magnitude of the Residues in or on Soybean Resulting from Seed Treatment followed by Foliar Applications – USA, 2011. Report Number: TK0040391. Morse Study Number: 67391. SGS Study Number: G-1110BK. Unpublished study prepared by Syngenta Crop Protection, LLC. 621 p.

EXECUTIVE SUMMARY:

Syngenta Crop Protection, LLC has submitted field trial data for abamectin on soybeans. Twenty field trials were conducted in the United States during the 2011 growing season in the North American Free Trade Agreement (NAFTA) Growing Zones 2 (VA and NC; 2 trials), 4 (AR, LA, MO; 3 trials), and 5 (IA, IL, MO, MN, ND, WI; 15 trials).

Each trial consisted of one untreated plot and one treated plot reflecting a combination of seed treatment and two foliar applications of abamectin. A 4.17 lb ai/gal flowable concentrate for seed treatment (FS) formulation (Abamectin 500FS; A14006B) was applied to soybean seed before planting. The seed was treated at the SGS North America, Inc. facility (Brookings, SD) using commercial seed treatment procedures. Seed treatment rates of ~0.0402-0.0884 lb ai/A were based on approximate seeding rates and actual seed treatment rates as reported for each field trial. Treated seed was planted within 2-36 days of treatment. Each treated plot received two foliar broadcast applications of a 0.70 lb ai/gal suspension concentrate (SC) formulation (Abamectin SC; A15368D) at 0.0181-0.0199 lb ai/A/application, except for the forage plot of Trial -10 (MN), where the second foliar application was made at 0.0223 lb ai/A. The first foliar applications were made to forage and hay plots 25-80 days after planting and to seed plots 75-117 days after planting; the second foliar applications were made at retreatment intervals (RTIs) of 6-9 days. All foliar applications were made using ground equipment in spray volumes of 2.5-35 gal/A. A nonionic surfactant (NIS) or crop oil concentrate (COC) was added to the foliar spray mixture for each trial. Total application rates including seed treatment and foliar applications were 0.077-0.127 lb ai/A. The highest combined application rates occurred at

Trial -01 (VA), where the seed treatment rate was 0.0884 lb ai/A for both plots. Excluding this trial, the maximum combined application rate was 0.102 lb ai/A.

Samples of soybean forage and hay were harvested from all trials at preharvest intervals (PHIs) of 6-8 days, and samples of seed were harvested from all trials at PHIs of 27-29 days. Additional forage and hay samples were collected at PHIs of 1, 3, 10, and 14 days, and additional seed samples were collected at PHIs of 20/21, 23/24, 31/32, and 34/35 days from two trials to assess residue decline. Hay samples were allowed to dry for 2-10 days prior to collection.

Samples of soybean forage, hay, and seed were analyzed for residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b} using a high performance liquid chromatography method with tandem mass spectrometric detection (LC/MS/MS), Morse Analytical Method Meth-192/Revision #2. The limit of quantitation (LOQ; determined as the lowest level of method validation, LLMV) was 0.002 ppm for each analyte in each soybean matrix, for a combined LOQ of 0.006 ppm. The method was adequate for data collection based on acceptable concurrent recovery data. The fortification levels used in concurrent method recovery were adequate to bracket expected residue levels. Concurrent recoveries were corrected for apparent residues in controls; residues in the treated samples were not corrected for apparent residues in controls.

Samples of soybean were stored frozen (<0 °C at the field sites and -25 to -10 °C at the analytical laboratory) from collection to analysis for 299-350 days (9.8 – 11.5 months) for forage, 362-440 days (11.9-14.5 months) for hay, and 317-360 days (10.4-11.8 months) for seed. Samples were analyzed within 0-6 days of extraction. Acceptable storage stability data are available demonstrating that residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} are stable under frozen storage conditions in/on cottonseed (avermectin B_{1a} only) for 14 months; in/on celery, tomato, and strawberries for 24 months; in/on oranges, lemons, and grapefruits for 29 months; and in/on pears for 35 months (DP# 191433, G. J. Herndon, 5/19/94). In addition, acceptable storage stability data have been submitted demonstrating that residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} are stable in/on corn grain and forage during frozen storage for up to 6 months (refer to 49071012.der) and in/on tomato, bean, sunflower seed, and potato for up to 24 months (refer to 49071016.der). The available and submitted storage stability data are adequate to support the storage conditions and durations for samples of soybean forage, hay, and seed from the submitted crop field trial study.

Following a combination of seed treatment with the 4.17 lb ai/gal FS formulation and two foliar broadcast applications of the 0.70 lb ai/gal SC formulation at total application rates of 0.077-0.127 lb ai/A, residues (and per trial averages) of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b}, respectively, in/on soybean forage and hay harvested at PHIs of 6-8 days were: 0.00805-0.158 (0.00983-0.152), <0.002-0.00990 (<0.002-0.00930), and <0.002-0.00495 (<0.002-0.00459) ppm in/on forage; and 0.0358-0.708 (0.0389-0.577), <0.002-0.0216 (<0.002-0.0199), and <0.002-0.0116 (<0.002-0.0105) ppm in/on hay. Residues of all three analytes were below the LOQ (<0.002 ppm) in/on soybean seed. Combined residues (and per trial averages) of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b} were <0.0121-0.165 (<0.0138-<0.158) ppm in/on forage, <0.0420-0.741 (<0.0448-0.607) ppm in/on hay, and <0.006 (<0.006) ppm

in/on seed. The highest residues in hay were observed in the trial which received the highest second foliar application (Trial -10).

In the residue decline trials, combined residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b} generally decreased with increasing PHIs in/on soybean forage and hay. In one trial, however, residues in/on hay increased from the 1- to the 3-day PHI and declined thereafter. Residues of all analytes were below the LOQ (<0.002 ppm) in/on all samples of seed; therefore, residue decline could not be evaluated.

STUDY/WAIVER ACCEPTABILITY/DEFICIENCIES/CLARIFICATIONS:

Under the conditions and parameters used in the study, the field trial residue data are classified as scientifically acceptable. The acceptability of this study for regulatory purposes is addressed in the forthcoming U.S. EPA Residue Chemistry Summary Document [DP# 414022].

COMPLIANCE:

Signed and dated Good Laboratory Practice (GLP), Quality Assurance, and Data Confidentiality statements were provided. No deviations from regulatory requirements were reported which would have an impact on the validity of the study.

A. BACKGROUND INFORMATION

Tolerances are established for the combined residues of avermectin B_1 [a mixture of avermectins containing ≥80% avermectin B_{1a} (5-*O*-demethyl avermectin A_1) and ≤20% avermectin B_{1b} (5-*O*-demethyl-25-de(1-methylpropyl)-25-(1-methylethyl) avermectin A_1)] and its delta-8,9-isomer. Abamectin is a natural fermentation product of the soil bacterium *Streptomyces avermitilis*. Abamectin is an insecticide/miticide used to control mites, leafminers, and other insects in commercially important crops, as a seed protectant against nematodes, and in veterinary medicine for treatment of internal and external parasites and mites.

The chemical structure and nomenclature of abamectin and the physicochemical properties of the technical grade of abamectin are presented in Tables A.1 and A.2.

TABLE A.1. Test Compound Nomenclature.

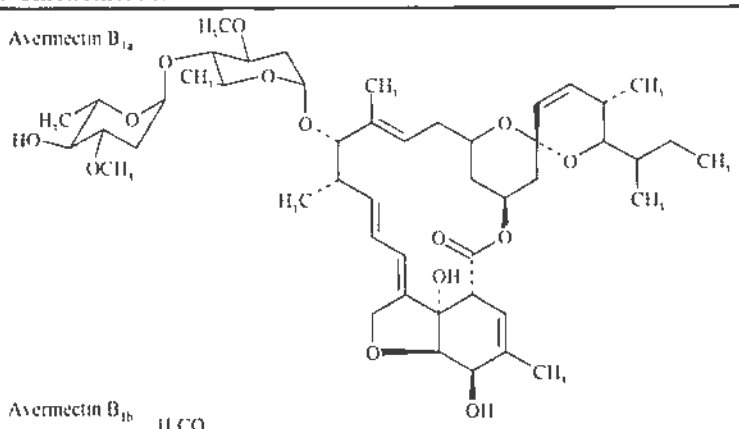
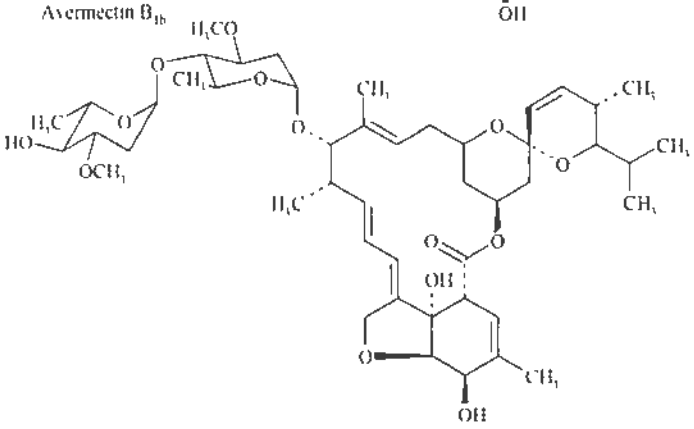
Compound	Avermectin B_{1a}  Avermectin B_{1b} 
Common name	Abamectin; Avermectin B_1
Company experimental name	MK0936
IUPAC name	mixture of ≥80% (10*E*,14*E*,16*E*)-(1*R*,4*S*,5'*S*,6*S*,6'*R*,8*R*,12*S*,13*S*,20*R*,21*R*,24*S*)-6'-[(*S*)-*sec*-butyl]-21,24-dihydroxy-5',11,13,22-tetramethyl-2-oxo-(3,7,19-trioxatetracyclo[15.6.1.1^{4,8}.0^{20,24}]pentacosa-10,14,16,22-tetraene)-6-spiro-2'-(5',6'-dihydro-2'*H*-pyran)-12-yl 2,6-dideoxy-4-*O*-(2,6-dideoxy-3-*O*-methyl-α-L-*arabino*-hexopyranosyl)-3-*O*-methyl-α-L-*arabino*-hexopyranoside and ≤20% (10*E*,14*E*,16*E*)-(1*R*,4*S*,5'*S*,6*S*,6'*R*,8*R*,12*S*,13*S*,20*R*,21*R*,24*S*)-21,24-dihydroxy-6'-isopropyl-5',11,13,22-tetramethyl-2-oxo-(3,7,19-trioxatetracyclo[15.6.1.1^{4,8}.0^{20,24}]pentacosa-10,14,16,22-tetraene)-6-spiro-2'-(5',6'-dihydro-2'*H*-pyran)-12-yl 2,6-dideoxy-4-*O*-(2,6-dideoxy-3-*O*-methyl-α-L-*arabino*-hexopyranosyl)-3-*O*-methyl-α-L-*arabino*-hexopyranoside
CAS name	Avermectin B_1
CAS registry number	71751-41-2
End-use product (EP)	4.17 lb ai/gal flowable concentrate for seed treatment (FS) formulation (Abamectin 500 FS; A14006B) 0.70 lb ai/gal suspension concentrate (SC) formulation (Abamectin SC, A15368D)

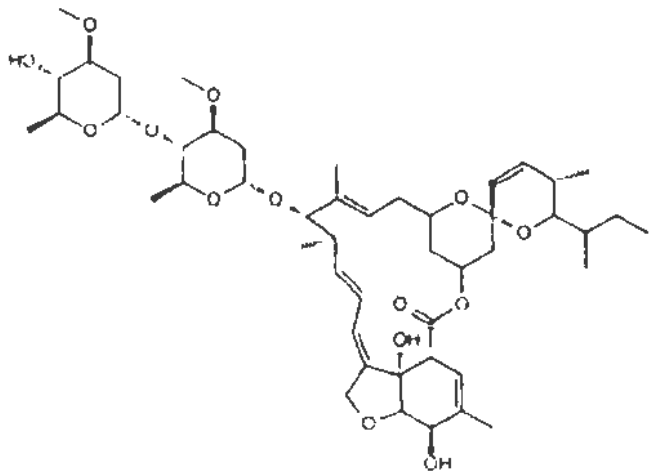
TABLE A.1. Test Compound Nomenclature.	
Compound	
Common name	8,9-Z Avermectin B_{1a}

TABLE A.2. Physicochemical Properties of the Technical Grade Test Compound Abamectin.		
Parameter	Value	Reference
Melting point/range	161.8-169.4°C (with thermal decomposition)	Study report (MRID 48758002)
pH	8-9 at 25°C	
Density	1.18 x 10^3 kg/m^3 at 22°C	
Water solubility at 25°C	1.21 µg/mL at pH 7.57	
Solubility in organic solvents	Acetone 72 g/L Dichloromethane 470 g/L Ethyl acetate 160 g/L Hexane 0.110 g/L Methanol 13 g/L Octanol 83 g/L Toluene 23 g/L	
Vapor pressure at 25°C	<3.7 x 10^{-9} Pa	
Dissociation constant (pK_a)	no dissociation constant in aqueous solution	
Octanol/water partition coefficient, Log P_{ow}	4.4 at pH 7.2	
UV visible absorption spectrum	Absorbance maxima Neutral: 32,549 l/mol•cm at 245 nm 18,983 l/mol•cm at 255 nm Acidic: 34,515 l/mol•cm at 245 nm 20,977 l/mol•cm at 255 nm Basic: 29,551 l/mol•cm at 245 nm	

B. EXPERIMENTAL DESIGN

B.1. Study Site Information

Twenty field trials were conducted in the United States during the 2011 growing season in the NAFTA Growing Zones 2 (VA and NC; 2 trials), 4 (AR, LA, MO; 3 trials), and 5 (IA, IL, MO,

MN, ND, WI; 15 trials). Three trial pairs were conducted at the same location and/or by the same principal field investigator. HED has determined that there are sufficient differences between the trials in each pair that they should be considered separate trials. The replicate trial determination for the study is summarized below.

Crop	Trial Nos.	PHI	Differences	Decision[1]
Soybean	-11 and -13	7 (forage, hay); 28 (seed)	Distance: ~29 miles Variety: Same Timing: 2 days between seed treatment, >30 days between first foliar applications	Separate due to distance and timing of first foliar application
	-07 and -08	7 (forage, hay); 28 (seed)	Distance: ~195 miles	Separate due to distance
	-6 and -19	7 (forage, hay); 28 (seed)	Distance: ~17 miles Variety: Same Timing: 7 days between seed treatment, 42 days between first foliar applications	Separate due to timing of first foliar application

[1]All assessments are based on the replicate trial guidance presented in draft memo 568_Criteria for Independence of Trials 04/23/2013 (EPA and PMRA).

Each trial consisted of one untreated plot and one treated plot reflecting a combination of seed treatment and two foliar applications of abamectin. A 4.17 lb ai/gal FS formulation (Abamectin 500FS; A14006B) was applied to soybean seed before planting. The seed was treated at the SGS North America, Inc. facility (Brookings, SD) using commercial seed treatment procedures. The test substance was applied to the seed using a Hege II Batch Treater. The nominal seed treatment rate was 0.15 mg ai/seed. Composite seed samples were shipped to SGS NAM GLP Laboratory (Brookings, SD) to confirm seed treatment rates. Actual seed treatment rates were 90.0-105.3% of the target rate. Seed treatment rates of ~0.0402-0.0884 lb ai/A were based on approximate seeding rates (124,069-260,282 seed/A) and actual seed treatment rates (0.135-0.158 mg ai/seed) as reported for each field trial. Treated seed was planted within 2-36 days of treatment. Each treated plot received two foliar broadcast applications of a 0.70 lb ai/gal SC formulation (Abamectin SC; A15368D) at 0.0181-0.0199 lb ai/A/application, except for the forage plot of Trial -10 (MN), where the second foliar application was made at 0.0223 lb ai/A. The first foliar applications were made to forage and hay plots 25-80 days after planting and to seed plots 75-117 days after planting; the second foliar applications were made at RTIs of 6-9 days. All foliar applications were made using ground equipment in spray volumes of 2.5-35 gal/A. An NIS or COC was added to the foliar spray mixture for each trial. Total application rates including seed treatment and foliar applications were 0.077-0.127 lb ai/A. The highest combined application rates occurred at Trial -01 (VA), where the seed treatment rate was 0.0884 lb ai/A for both plots. Excluding this trial, the maximum combined application rate was 0.102 lb ai/A.

Samples of soybean forage and hay were harvested from all trials at PHIs of 6-8 days, and samples of seed were harvested from all trials at PHIs of 27-29 days. Additional forage and hay samples were collected at PHIs of 1, 3, 10, and 14 days from two trials to assess residue decline; additional seed samples were collected at PHIs of 20/21, 23/24, 31/32, and 34/35 days. Hay samples were allowed to dry for 2-10 days prior to collection.

Maintenance pesticides and fertilizers were used as needed to produce a commercial quality crop. Monthly temperature ranges and total monthly precipitation were provided for each trial, as well as the historical averages. Irrigation was used to supplement rainfall as needed. Although variations in temperature and precipitation were reported, no abnormal weather events were indicated to have adversely impacted crop yields or crop growth and development at the trial sites, with the following exceptions: at Trial -11 rainfall early in the season (June/July) stunted crop growth; and at Trial -13, a hail event damaged the crop (30-40%) in July, but the crop recovered with yields in the normal range at maturity. The lowest average field trial residues (LAFT) for both forage and hay were observed in samples from Trial -13.

Trial conditions are presented in Table B.1.1. The study use pattern is presented in Table B.1.2, and the crop varieties grown are identified in Table C.3.

TABLE B.1.1 Trial Site Conditions.

Trial Identification: City, State: Year (Trial No.)	Soil characteristics			
	Type	% OM	pH	CEC (meq/100 g)
Suffolk, VA; 2011 (TK0040391-01)	Sandy Loam	1.5	5.8	3.7
Seven Springs, NC; 2011 (TK0040391-02)	Sandy Loam	0.4	5.6	1.9
Pollard, AR; 2011 (TK0040391-03)	Clay Loam	2.1	7	19.7
Cheneyville, LA; 2011 (TK0040391-04)	Silty Loam	0.64	6.47	9.28
Fisk, MO; 2011 (TK0040391-05)	Loamy Sand	1.2	7.2	4.8
Hedrick, IA; 2011 (TK0040391-06)	Silty Clay Loam	3.8	7.7	18.8
Carlyle, IL; 2011 (TK0040391-07)	Silt Loam	2.6	6.58	12.1
Wyoming, IL; 2011 (TK0040391-08)	Silt Loam	2.8	6.9	13.7
Fisk, MO; 2011 (TK0040391-09)	Silt Loam	1.7	5.7	8.7
Geneva, MN; 2011 (TK0040391-10)	Sandy Loam	1.3	6.5	36.9
Northwood, ND; 2011 (TK0040391-11)	Loam	4.3	7.4	25.2
Cherry Grove, MN; 2011 (TK0040391-12)	Clay Loam	10.3	7.4	40.6
McVille, ND; 2011 (TK0040391-13)	Sandy Loam	2.6	6.2	16.7
Ellendale, MN; 2011 (TK0040391-14)	Sandy Clay Loam	3.5	5.9	19.7
Fitchburg, WI; 2011 (TK0040391-15)	Silt Clay Loam	2.9	5.5	11.5
Seymour, IL; 2011 (TK0040391-16)	Silt Loam	4.7	6.4	20.3
Bellmore, IN; 2011 (TK0040391-17)	Silt Loam	2.6	7.5	12.3
Rice, MN; 2011 (TK0040391-18)	Sand	1.2	6.4	6.0
Richland, IA; 2011 (TK0040391-19)	Silty Clay Loam	4.3	6.5	25.7
Bagley, IA; 2011 (TK0040391-20)	Clay Loam	4.8	7.1	26.6

TABLE B.1.2. Study Use Pattern.

Trial Identification: City, State: Year (Trial No.)	Plot[1]	EP[2]	Application Information					Tank Mix/ Adjuvants[6]
			Method; Timing[3]	Volume (gal/A)	Rate[4] (lb ai/A)	RTI[5] (days)	Total Rate[4] (lb ai/A)	
Suffolk, VA; 2011 (TK0040391-01)	2A	4.17 lb ai/gal FS	1. Seed treatment; 9 days before planting	--	0.0884	--	0.127	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 67	12	0.0196	80		NIS
			3. Foliar broadcast; BBCH 67	13	0.0192	7		NIS
	3A	4.17 lb ai/gal FS	1. Seed treatment; 9 days before planting	--	0.0884	--	0.127	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 75	14	0.0192	108		NIS
			3. Foliar broadcast; BBCH 85	13	0.0191	7		NIS
Seven Springs, NC; 2011 (TK0040391-02)	2A	4.17 lb ai/gal FS	1. Seed treatment; 7 days before planting	--	0.0476	--	0.0859	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 25	35	0.0192	49		COC
			3. Foliar broadcast; BBCH 61	32	0.0191	7		COC
	3A	4.17 lb ai/gal FS	1. Seed treatment; 7 days before planting	--	0.0501	--	0.0879	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 75	30	0.0191	107		COC
			3. Foliar broadcast; BBCH 77	31	0.0187	6		COC
Pollard, AR; 2011 (TK0040391-03)	2A	4.17 lb ai/gal FS	1. Seed treatment; 36 days before planting	--	0.0559	--	0.0942	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 63	3.0	0.0192	38		NIS
			3. Foliar broadcast; BBCH 65	3.0	0.0191	6		NIS
	3A	4.17 lb ai/gal FS	1. Seed treatment; 36 days before planting	--	0.0559	--	0.0940	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 79	3.0	0.0190	83		NIS
			3. Foliar broadcast; BBCH 81	3.0	0.0191	7		NIS
Cheneyville, LA; 2011 (TK0040391-04)	2A	4.17 lb ai/gal FS	1. Seed treatment; 12 days before planting	--	0.0543	--	0.0937	--
		0.70 lb ai/gal SC	2. Foliar broadcast; V6	17	0.0195	33		COC
			3. Foliar broadcast; R1	17	0.0199	8		COC
	3A	4.17 lb ai/gal FS	1. Seed treatment; 12 days before planting	--	0.0543	--	0.0913	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 79	26	0.0184	89		COC
			3. Foliar broadcast; BBCH 79-80	17	0.0186	7		COC
Fisk, MO; 2011 (TK0040391-05)	2A	4.17 lb ai/gal FS	1. Seed treatment; 22 days before planting	--	0.0559	--	0.0938	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 63	20	0.0189	44		NIS
			3. Foliar broadcast; BBCH 65	20	0.0190	7		NIS
	3A	4.17 lb ai/gal FS	1. Seed treatment; 22 days before planting	--	0.0559	--	0.0936	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 79	20	0.0188	97		NIS
			3. Foliar broadcast; BBCH 81	20	0.0189	7		NIS

TABLE B.1.2. Study Use Pattern.

Trial Identification: City, State: Year (Trial No.)	Plot[1]	EP[2]	Application Information					Tank Mix/ Adjuvants[6]
			Method; Timing[3]	Volume (gal/A)	Rate[4] (lb ai/A)	RTI[5] (days)	Total Rate[4] (lb ai/A)	
Hedrick, IA; 2011 (TK0040391-06)	2A	4.17 lb ai/gal FS	1. Seed treatment; 18 days before planting	--	0.0506	--	0.0889	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 61	21	0.0193	49		COC
			3. Foliar broadcast; BBCH 65	20	0.0190	6		COC
	3A	4.17 lb ai/gal FS	1. Seed treatment; 18 days before planting	--	0.0506	--	0.0889	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 79	17	0.0192	87		COC
			3. Foliar broadcast; BBCH 79	18	0.0191	8		COC
Carlyle, IL; 2011 (TK0040391-07)	2A	4.17 lb ai/gal FS	1. Seed treatment; 24 days before planting	--	0.0486	--	0.0868	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 17	2.6	0.0191	33		NIS
			3. Foliar broadcast; BBCH 61	2.6	0.0191	7		NIS
	3A	4.17 lb ai/gal FS	1. Seed treatment; 24 days before planting	--	0.0486	--	0.0873	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 79	2.6	0.0193	82		NIS
			3. Foliar broadcast; BBCH 79	2.6	0.0194	7		NIS
Wyoming, IL; 2011 (TK0040391-08)	2A	4.17 lb ai/gal FS	1. Seed treatment; 2 days before planting	--	0.0451	--	0.0826	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 17	16	0.0186	34		COC
			3. Foliar broadcast; BBCH 16 & 61	17	0.0189	7		COC
	3A	4.17 lb ai/gal FS	1. Seed treatment; 2 days before planting	--	0.0451	--	0.0829	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 81	18	0.0190	117		COC
			3. Foliar broadcast; BBCH 86	17	0.0188	7		COC
Fisk, MO; 2011 (TK0040391-09)	2A	4.17 lb ai/gal FS	1. Seed treatment; 36 days before planting	--	0.0559	--	0.0936	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 63	20	0.0189	37		NIS
			3. Foliar broadcast; BBCH 65	20	0.0188	6		NIS
	3A	4.17 lb ai/gal FS	1. Seed treatment; 36 days before planting	--	0.0559	--	0.0939	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 79	20	0.0189	83		NIS
			3. Foliar broadcast; BBCH 81	20	0.0191	7		NIS
Geneva, MN; 2011 (TK0040391-10)	2A	4.17 lb ai/gal FS	1. Seed treatment; 20 days before planting	--	0.0537	--	0.0950	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 62	20	0.0190	35		COC
			3. Foliar broadcast; R2	20	0.0223	8		COC
	3A	4.17 lb ai/gal FS	1. Seed treatment; 20 days before planting	--	0.0537	--	0.0921	--
		0.70 lb ai/gal SC	2. Foliar broadcast; R6	22	0.0193	81		COC
			3. Foliar broadcast; Early R7	21	0.0191	7		COC

TABLE B.1.2. Study Use Pattern.

Trial Identification: City, State: Year (Trial No.)	Plot[1]	EP[2]	Application Information					Tank Mix/ Adjuvants[6]
			Method; Timing[3]	Volume (gal/A)	Rate[4] (lb ai/A)	RTI[5] (days)	Total Rate[4] (lb ai/A)	
Northwood, ND; 2011 (TK0040391-11)	2A	4.17 lb ai/gal FS	1. Seed treatment; 2 days before planting	--	0.0592	--	0.0982	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 64	2.5	0.0192	53		NIS
			3. Foliar broadcast; BBCH 71	2.6	0.0198	7		NIS
	3A	4.17 lb ai/gal FS	1. Seed treatment; 2 days before planting	--	0.0592	--	0.0974	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 79	2.5	0.0189	99		NIS
			3. Foliar broadcast; BBCH 79	2.6	0.0193	7		NIS
Cherry Grove, MN; 2011 (TK0040391-12)	2A	4.17 lb ai/gal FS	1. Seed treatment; 3 days before planting	--	0.0638	--	0.102	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 60	31	0.0195	42		COC
			3. Foliar broadcast; BBCH 65	25	0.0191	9		COC
	3A	4.17 lb ai/gal FS	1. Seed treatment; 3 days before planting	--	0.0574	--	0.0962	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 77	30	0.0196	89		COC
			3. Foliar broadcast; BBCH 79	29	0.0192	7		COC
McVille, ND; 2011 (TK0040391-13)	2A	4.17 lb ai/gal FS	1. Seed treatment; 7 days before planting	--	0.0592	--	0.0976	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 61	20	0.0193	39		NIS
			3. Foliar broadcast; BBCH 67	20	0.0191	7		NIS
	3A	4.17 lb ai/gal FS	1. Seed treatment; 7 days before planting	--	0.0592	--	0.0971	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 79	20	0.0189	94		NIS
			3. Foliar broadcast; BBCH 79	20	0.0190	7		NIS
Ellendale, MN; 2011 (TK0040391-14)	2A	4.17 lb ai/gal FS	1. Seed treatment; 3 days before planting	--	0.0530	--	0.0914	--
		0.70 lb ai/gal SC	2. Foliar broadcast; R2	20	0.0193	42		COC
			3. Foliar broadcast; R2	21	0.0191	7		COC
	3A	4.17 lb ai/gal FS	1. Seed treatment; 3 days before planting	--	0.0521	--	0.0900	--
		0.70 lb ai/gal SC	2. Foliar broadcast; R6	20	0.0189	92		COC
			3. Foliar broadcast; R6	21	0.0190	7		COC
Fitchburg, WI; 2011 (TK0040391-15)	2A	4.17 lb ai/gal FS	1. Seed treatment; 7 days before planting	--	0.0563	--	0.0942	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 12	28	0.0189	25		NIS
			3. Foliar broadcast; BBCH 13-14	28	0.0190	6		NIS
	3A	4.17 lb ai/gal FS	1. Seed treatment; 7 days before planting	--	0.0563	--	0.0945	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 79	28	0.0191	99		NIS
			3. Foliar broadcast; BBCH 81-85	28	0.0191	8		NIS

TABLE B.1.2. Study Use Pattern.

Trial Identification; City, State; Year (Trial No.)	Plot[1]	EP[2]	Application Information					Tank Mix/ Adjuvants[6]
			Method; Timing[3]	Volume (gal/A)	Rate[4] (lb ai/A)	RTI[5] (days)	Total Rate[4] (lb ai/A)	
Seymour, IL; 2011 (TK0040391-16)	2A	4.17 lb ai/gal FS	1. Seed treatment; 24 days before planting	--	0.0517	--	0.0890	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 15 (V5)	24	0.0186	31		COC
			3. Foliar broadcast; R2	25	0.0187	8		COC
	3A	4.17 lb ai/gal FS	1. Seed treatment; 24 days before planting	--	0.0517	--	0.0892	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 79	25	0.0187	77		COC
			3. Foliar broadcast; BBCH 79	25	0.0188	7		COC
Bellmore, IN; 2011 (TK0040391-17)	2A	4.17 lb ai/gal FS	1. Seed treatment; 3 days before planting	--	0.0486	--	0.0870	--
		0.70 lb ai/gal SC	2. Foliar broadcast; R1	23	0.0197	49		NIS
			3. Foliar broadcast; BBCH 69 (R2)	21	0.0187	6		NIS
	3A	4.17 lb ai/gal FS	1. Seed treatment; 3 days before planting	--	0.0486	--	0.0875	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 75-77	23	0.0191	82		NIS
			3. Foliar broadcast; BBCH 79	24	0.0198	8		NIS
Rice, MN; 2011 (TK0040391-18)	2A	4.17 lb ai/gal FS	1. Seed treatment; 11 days before planting	--	0.0461	--	0.0842	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 63	20	0.0190	53		COC
			3. Foliar broadcast; BBCH 65	20	0.0191	7		COC
	3A	4.17 lb ai/gal FS	1. Seed treatment; 11 days before planting	--	0.0461	--	0.0845	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 75	20	0.0193	75		COC
			3. Foliar broadcast; BBCH 85	20	0.0191	7		COC
Richland, IA; 2011 (TK0040391-19)	2A	4.17 lb ai/gal FS	1. Seed treatment; 12 days before planting	--	0.0413	--	0.0807	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 61	28	0.0197	52		NIS
			3. Foliar broadcast; BBCH 65	28	0.0197	7		NIS
	3A	4.17 lb ai/gal FS	1. Seed treatment; 12 days before planting	--	0.0413	--	0.0800	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 79	20	0.0194	96		NIS
			3. Foliar broadcast; BBCH 80	20	0.0193	6		NIS
Bagley, IA; 2011 (TK0040391-20)	2A	4.17 lb ai/gal FS	1. Seed treatment; 6 days before planting	--	0.0402	--	0.0776	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 51	9.7	0.0186	46		COC
			3. Foliar broadcast; BBCH 63	13	0.0188	8		COC
	3A	4.17 lb ai/gal FS	1. Seed treatment; 6 days before planting	--	0.0402	--	0.0770	--
		0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 71	7.7	0.0187	81		COC
			3. Foliar broadcast; BBCH 73	9.1	0.0181	6		COC

[1] Plot 2A was established for harvest of forage and hay. Plot 3A was established for harvest of seed.
[2] EP = End-use Product: 4.17 lb ai/gal flowable concentrate for seed treatment (FS) formulation (Abamectin 500 FS; A14006B) and 0.70 lb ai/gal suspension concentrate (SC) formulation (Abamectin SC; A15368D).
[3] Days before planting = no. of days from seed treatment to planting.
[4] Application rates in lb ai/A for seed treatment were based on approximate seeding rates (seed/A) and actual seed treatment rates (mg ai/seed) as reported in each field trial. Total rate = sum of seed treatment and two foliar applications.
[5] RTI Retreatment interval (days after planting for interval between seed treatment and first foliar application).
[6] NIS = nonionic surfactant. COC = crop oil concentrate.

TABLE B.1.3. Trial Numbers and Geographical Locations.

NAFTA Growing Regions	Soybean		
	Submitted	Requested[1]	
		Canada	U.S.
1	--	--	--
1A	--	--	--
2	2	--	2/2
3	--	--	--
4	3	--	3/2
5	15	--	15/11
5A	--	--	--
5B	--	--	--
6	--	--	--
7	--	--	--
7A	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--
13	--	--	--
14	--	--	--
15	--	--	--
16	--	--	--
17	--	--	--
18	--	--	--
19	--	--	--
20	--	--	--
21	--	--	--
Total	20		20/15

[1] As per Table 5 of OCSPP 860.1500 for soybean. The second number reflects a 25% reduction in the number of field trials allowed for the crop as a representative commodity in support of a crop group/subgroup tolerance or when application results in no quantifiable residues.

B.2. Sample Handling and Preparation

Single control and duplicate treated samples of soybean forage and hay were harvested during the bloom period from each site 6-8 days after the second foliar application; hay samples were allowed to dry for 2-10 days prior to collection. Soybean seed was harvested 27-29 days after

the second foliar application. Additional forage and hay samples were collected at PHIs of 1, 3, 10, and 14 days from two trials to assess residue decline; additional seed samples were collected at PHIs of 20/21, 23/24, 31/32, and 34/35 days. After collection, crop samples were placed in frozen storage (<0 °C) at the field sites within 0.03-3.07 hours of collection and stored frozen for 1-51 days until shipment via freezer truck to the analytical laboratory, Morse Laboratories, LLC (Sacramento, CA), where they were stored frozen (-25 to -10 °C) until analysis. In preparation for analysis, samples were homogenized using a cutter-mixer in the presences of dry ice.

B.3. Analytical Methodology

Samples were analyzed using Morse Labs Method Meth-192/Revision #2, entitled "Determination of Abamectin Residues in Fruits and Vegetables (Raw Agricultural Commodity) by LC-MS/MS" with slight modifications. A description of the method including details of modifications was included in the submission.

Briefly, samples were extracted with acetonitrile:1% phosphoric acid (25:75, v:v). Samples were allowed to soak in the extraction solvent for 10-15 minutes prior to homogenization. Residues were then partitioned into hexane. An aliquot of the extract was purified on an aminopropyl solid phase extraction (SPE) column. The purified extract was evaporated to dryness and redissolved in acetonitrile for LC/MS/MS analysis.

The LOQ (determined as the LLMV) was 0.002 ppm for each analyte in each soybean matrix, for a combined LOQ of 0.006 ppm; the limit of detection (LOD) was not reported.

The method was validated prior to and in conjunction with analysis of the field trial samples.

C. RESULTS AND DISCUSSION

Sample storage conditions and durations are reported in Table C.2. Samples of soybean were stored frozen (frozen at the field sites and -25 to -10 °C at the analytical laboratory) from collection to analysis for 299-350 days (9.8 – 11.5 months) for forage, 362-440 days (11.9-14.5 months) for hay, and 317-360 days (10.4-11.8 months) for seed. Samples were analyzed within 0-6 days of extraction. Acceptable storage stability data are available demonstrating that residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} are stable under frozen storage conditions in/on cottonseed (avermectin B_{1a} only) for 14 months; in/on celery, tomato, and strawberries for 24 months; in/on oranges, lemons, and grapefruits for 29 months; and in/on pears for 35 months (DP# 191433, G. J. Herndon, 5/19/94). In addition, acceptable storage stability data have been submitted demonstrating that residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} are stable in/on corn grain and forage during frozen storage for up to 6 months (refer to 49071012.der) and in/on tomato, bean, sunflower seed, and potato for up to 24 months (refer to 49071016.der). The available and submitted storage stability data are adequate to support the storage conditions and durations for samples of soybean forage, hay and seed from the submitted crop field trial study.

Method validation and concurrent method recovery data for the LC/MS/MS method are presented in Table C.1. For method validation, samples were fortified with avermectin B_{1a} at 0.002-3.36 ppm and with avermectin B_{1b} and 8,9-Z avermectin B_{1a} at 0.002-0.20 ppm. For concurrent method recovery, samples were fortified with avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a}, respectively, at 0.002-2.0, 0.002-0.012, and 0.002-0.20 ppm for forage; 0.002-5.0, 0.002-0.30, and 0.002-0.20 ppm for hay; and 0.002-0.0336, 0.002, and 0.002-0.20 ppm for seed. The method was adequate for data collection based on acceptable concurrent recovery data. Recoveries were generally within the acceptable range of 70-120%, but tended to be skewed low for all analytes in soybean seed. The fortification levels used in concurrent method recovery were adequate to bracket expected residue levels. Apparent residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} were below the LOQ in/on all samples of untreated soybean forage, hay and seed, except for two hay samples with residues just above the LOQ (0.00246 ppm from Trial -15 and 0.00202 ppm from Trial -20). Concurrent recoveries were corrected for apparent residues in controls; residues in the treated samples were not corrected for apparent residues in controls.

Residue data from the soybean field trials are reported in Table C.3, and a summary of residue data is presented in Table C.4. Following a combination of seed treatment with the 4.17 lb ai/gal FS formulation and two foliar broadcast applications of the 0.70 lb ai/gal SC formulation at total application rates of 0.077-0.127 lb ai/A, residues (and per trial averages) of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b}, respectively, in/on soybean forage and hay harvested at PHIs of 6-8 days were: 0.00805-0.158 (0.00983-0.152), <0.002-0.00990 (<0.002-0.00930), and <0.002-0.00495 (<0.002-0.00459) ppm in/on forage; and 0.0358-0.708 (0.0389-0.577), <0.002-0.0216 (<0.002-0.0199), and <0.002-0.0116 (<0.002-0.0105) ppm in/on hay. Residues of all three analytes were below the LOQ (<0.002 ppm) in/on soybean seed. Combined residues (and per trial averages) of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b} were <0.0121-0.165 (<0.0138-<0.158) ppm in/on forage, <0.0420-0.741 (<0.0448-0.607) ppm in/on hay, and <0.006 (<0.006) ppm in/on seed. The highest residues in hay were observed in the trial which received the highest second foliar application (Trial -10).

In the residue decline trials, combined residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b} generally decreased with increasing PHIs in/on soybean forage and hay. In one trial, however, residues in/on hay increased from the 1- to the 3-day PHI and declined thereafter. Residues of all analytes were below the LOQ (<0.002 ppm) in/on all samples of seed; therefore, residue decline could not be evaluated.

TABLE C.1. Summary of Method Validation and Concurrent Recoveries of Abamectin from Soybean.

Matrix	Analyte	Spike Level (ppm)	Sample Size (n)	Recoveries (%)[1]	Mean ± Std. Dev. (%)[2]
Method Validation					
Soybean, forage	Avermectin B_{1a}	0.002	3	77, 94, 81	84 ± 8.9
		0.0336	3	88, 88, 88	88 ± 0
		3.36	3	90, 95, 92	92 ± 2.5
	Avermectin B_{1b}	0.002	3	68, 67, 63	66 ± 2.6
		0.20	3	82, 76, 89	82 ± 6.5
	Avermectin B_{1a}, 8,9-Z isomer	0.002	3	69, 85, 87	80 ± 9.9
		0.20	3	104, 106, 104	105 ± 1.2
Soybean, hay	Avermectin B_{1a}	0.002	3	98, 70, 114	94 ± 22
		0.0336	3	88, 78, 74	80 ± 7.2
		3.36	3	99, 79, 72	83 ± 14
	Avermectin B_{1b}	0.002	3	79, 76, 83	79 ± 3.5
		0.20	3	74, 87, 76	79 ± 7.0
	Avermectin B_{1a}, 8,9-Z isomer	0.002	3	83, 103, 96	94 ± 10
		0.20	3	88, 89, 83	87 ± 3.2
Soybean, seed	Avermectin B_{1a}	0.002	3	98, 85, 66	83 ± 16
		0.0336	3	81, 71, 94	82 ± 12
		3.36	3	71, 73, 79	74 ± 4.2
	Avermectin B_{1b}	0.002	3	109, 118, 86	104 ± 17
		0.20	3	82, 70, 82	78 ± 6.9
	Avermectin B_{1a}, 8,9-Z isomer	0.002	3	93, 77, 111	94 ± 17
		0.20	3	91, 94, 93	93 ± 1.5
Concurrent Recovery					
Soybean, forage	Avermectin B_{1a}	0.002	6	71, 74, 81, 83, 83, 98	82 ± 9.4
		0.0336	5	82, 85, 87, 88, 92	87 ± 3.7
		0.20	1	80	80
		2.0	1	81	81
	Avermectin B_{1b}	0.002	5	84, 85, 111, 119, 120	104 ± 18
		0.012	1	76	76
	Avermectin B_{1a}, 8,9-Z isomer	0.002	6	61, 64, 70, 87, 99, 102	80 ± 18
		0.20	6	76, 80, 84, 86, 92, 94	85 ± 6.9
Soybean, hay	Avermectin B_{1a}	0.002	6	62, 71, 74, 84, 88, 94	79 ± 12
		0.0336	6	72, 79, 80, 86, 91, 93	84 ± 8.0
		5.0	1	79	79
	Avermectin B_{1b}	0.002	6	60, 70, 81, 82, 85, 99	80 ± 13
		0.30	1	63	63
	Avermectin B_{1a}, 8,9-Z isomer	0.002	6	62, 64, 74, 75, 109, 118	84 ± 24
		0.20	6	62, 72, 89, 94, 98, 106	87 ± 17

TABLE C.1. Summary of Method Validation and Concurrent Recoveries of Abamectin from Soybean.

Matrix	Analyte	Spike Level (ppm)	Sample Size (n)	Recoveries (%)[1]	Mean ± Std. Dev. (%)[2]
Soybean, seed	Avermectin B_{1a}	0.002	6	62, 68, 77, 78, 88, 93	78 ± 12
		0.0336	6	60, 67, 76, 80, 83, 96	77 ± 13
	Avermectin B_{1b}	0.002	6	62, 62, 64, 66, 76, 83	69 ± 8.7
	Avermectin B_{1a}, 8,9-Z isomer	0.002	6	61, 64, 64, 69, 76, 82	69 ± 8.1
		0.20	6	73, 84, 90, 92, 96, 101	89 ± 9.8

[1] Concurrent recoveries were corrected for apparent residues in control samples.
[2] Standard deviations are calculated only for fortification levels having ≥3 samples.

TABLE C.2. Summary of Storage Conditions.

Matrix	Storage Temperature (°C)	Actual Storage Duration[1]	Limit of Demonstrated Storage Stability
Soybean, forage	Frozen at field sites; -25 to -10 at analytical laboratory	299-350 days (9.8 – 11.5 months)	Acceptable storage stability data are available demonstrating that residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} are stable under frozen storage conditions in/on cottonseed (avermectin B_{1a} only) for 14 months; in/on celery, tomato, and strawberries for 24 months; in/on oranges, lemons, and grapefruits for 29 months; and in/on pears for 35 months (DP# 191433, G. J. Herndon, 5/19/94). In addition, acceptable storage stability data have been submitted demonstrating that residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} are stable in/on corn grain and forage during frozen storage for up to 6 months (refer to 49071012.der) and in/on tomato, bean, sunflower seed, and potato for up to 24 months (refer to 49071016.der).
Soybean, hay		362 - 440 days (11.9-14.5 months)	
Soybean, seed		317-360 days (10.4-11.8 months)	

[1] Interval from harvest to analysis. Samples were analyzed within 0-6 days of extraction.

TABLE C.3. Residue Data from Soybean Field Trials with Abamectin.

Trial ID (City, State: Year)	Zone	Soybean Variety	Commodity	Total Rate (lb ai/A)	PHI[1] (days)	Residues (ppm)[2] [Average]			
						Avermectin B_{1a}	8,9-Z Avermectin B_{1a}	Avermectin B_{1b}	Combined Residues[3]
Suffolk, VA; 2011 (TK0040391-01)	2	S56-G6	Forage	0.127	8	0.0236, 0.0178 [0.0207]	<0.002, <0.002 [<0.002]	<0.002, <0.002 [<0.002]	<0.0276, <0.0218 [<0.0247]
			Hay		8 (8)	0.0384, 0.0486 [0.0435]	0.00292, 0.00397 [0.00344]	<0.002, <0.002 [<0.002]	<0.0433, <0.0546 [<0.0489]
			Seed	0.127	28	ND, ND [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]

TABLE C.3. Residue Data from Soybean Field Trials with Abamectin.

Trial ID (City, State; Year)	Zone	Soybean Variety	Commodity	Total Rate (lb ai/A)	PHI[1] (days)	Residues (ppm)[2] [Average]			
						Avermectin B_{1a}	8,9-Z Avermectin B_{1a}	Avermectin B_{1b}	Combined Residues[3]
Seven Springs, NC; 2011 (TK0040391-02)	2	S56-G6	Forage	0.0859	7	0.0920, 0.0880 [0.0900]	0.00373, 0.00505 [0.00439]	0.00219, <0.002 [<0.00210]	0.0979, <0.0950 [<0.0965]
			Hay		7 (8)	0.327, 0.232 [0.280]	0.0106, 0.0104 [0.0105]	0.00585, 0.00495 [0.00540]	0.343, 0.247 [0.295]
			Seed	0.0879	29	<0.002, ND [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]
Pollard, AR; 2011 (TK0040391-03)	4	S49-A5	Forage	0.0942	7	0.0262, 0.0332 [0.0297]	<0.002, <0.002 [<0.002]	<0.002, <0.002 [<0.002]	<0.0302, <0.0372 [<0.0337]
			Hay		7 (5)	0.138, 0.161 [0.150]	<0.002, <0.002 [<0.002]	0.00294, 0.00487 [0.00390]	<0.143, <0.168 [<0.156]
			Seed	0.0940	27	<0.002, <0.002 [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]
Cheneyville, LA; 2011 (TK0040391-04)	4	S49-A5	Forage	0.0937	7	0.0102, 0.0122 [0.0112]	0.00635, 0.00417 [0.00526]	0.00265, <0.002 [0.00232]	0.0192, <0.0184 [0.0188]
			Hay		7 (4)	0.193, 0.226 [0.210]	0.00845, 0.0132 [0.0108]	0.00426, 0.00555 [0.00490]	0.206, 0.245 [0.226]
			Seed	0.0913	27	ND, ND [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]
Fisk, MO; 2011 (TK0040391-05)	4	S49-A5	Forage	0.0938	6	0.0100, 0.0101 [0.0100]	<0.002, <0.002 [<0.002]	<0.002, <0.002 [<0.002]	<0.0140, <0.0141 [<0.0140]
			Hay		6 (2)	0.0358, 0.0420 [0.0389]	0.00421, 0.00374 [0.00398]	<0.002, <0.002 [<0.002]	<0.0420, <0.0477 [<0.0449]
			Seed	0.0936	27	<0.002, <0.002 [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]
Hedrick, IA; 2011 (TK0040391-06)	5	S33-K5	Forage	0.0889	7	0.131, 0.116 [0.124]	0.00680, 0.00510 [0.00595]	0.00270, <0.002 [<0.00235]	0.141, <0.123 [<0.132]
			Hay		7 (4)	0.556, 0.502 [0.529]	0.0182, 0.0135 [0.0158]	0.00940, 0.00665 [0.00802]	0.584, 0.522 [0.553]
			Seed	0.0889	28	ND, ND [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]

TABLE C.3. Residue Data from Soybean Field Trials with Abamectin.

Trial ID (City, State; Year)	Zone	Soybean Variety	Commodity	Total Rate (lb ai/A)	PHI[1] (days)	Residues (ppm)[2] [Average]			
						Avermectin B_{1a}	8,9-Z Avermectin B_{1a}	Avermectin B_{1b}	Combined Residues[3]
Carlyle, IL; 2011 (TK0040391-07)	5	S33-K5	Forage	0.0868	1	0.515	0.00530	<0.002	<0.522
					3	0.245	0.00222	<0.002	<0.249
					7	0.0840, 0.133 [0.1085]	<0.002, <0.002 [<0.002]	0.00397, 0.00481 [0.00439]	<0.0900, <0.140 [<0.115]
					10	0.0668	<0.002	<0.002	<0.0708
					14	0.0425	<0.002	<0.002	<0.0465
			Hay		1 (5)	0.740	0.003694	0.0138	0.757
					3 (3)	2.01	0.0102	0.0330	2.05
					7 (3)	0.322, 0.323 [0.322]	<0.002, 0.00212 [<0.00206]	0.00800, 0.00770 [0.00785]	<0.332, 0.333 [<0.332]
					10 (5)	0.173	<0.002	0.00393	0.179
					14 (3)	0.161	<0.002	0.00310	0.166
			Seed	0.0873	20	ND	ND	ND	<0.006
					24	ND	ND	ND	<0.006
					28	ND, ND [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]
					31	ND	ND	ND	<0.006
					35	ND	ND	ND	<0.006
Wyoming, IL; 2011 (TK0040391-08)	5	S33-K5	Forage	0.0826	1	1.10	0.0106	ND	<1.11
					3	0.740	0.00925	0.00253	0.752
					7	0.146, 0.158 [0.152]	0.00371, 0.00423 [0.00397]	ND, 0.00272 [<0.00236]	<0.152, 0.165 [<0.158]
					10	0.0673	0.00202	<0.002	<0.0713
					14	0.0358	<0.002	<0.002	<0.0398
			Hay		1 (2)	3.16	0.0314	0.0748	3.27
					3 (3)	1.93	0.0247	0.0352	1.99
					7 (6)	0.410, 0.386 [0.398]	0.00810, 0.00775 [0.00792]	0.00785, 0.00735 [0.00760]	0.426, 0.401 [0.414]
					10 (4)	0.129	0.00386	0.00310	0.136
					14 (2)	0.0620	<0.002	<0.002	<0.066
			Seed	0.0829	21	<0.002	ND	ND	<0.006
					23	<0.002	ND	ND	<0.006
					28	<0.002, <0.002 [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]
					32	<0.002	ND	ND	<0.006
					34	ND	ND	ND	<0.006

TABLE C.3. Residue Data from Soybean Field Trials with Abamectin.

Trial ID (City, State: Year)	Zone	Soybean Variety	Commodity	Total Rate (lb ai/A)	PHI[1] (days)	Residues (ppm)[2] [Average]			
						Avermectin B_{1a}	8,9-Z Avermectin B_{1a}	Avermectin B_{1b}	Combined Residues[3]
Fisk, MO; 2011 (TK0040391-09)	5	S49-A5	Forage	0.0936	8	0.0130, 0.0175 [0.0152]	<0.002, <0.002 [<0.002]	<0.002, <0.002 [<0.002]	<0.0170, <0.0215 [<0.0192]
			Hay		8 (5)	0.0710, 0.0733 [0.0722]	0.00625, 0.00540 [0.00582]	0.00242, 0.00254 0.00248	0.0797, 0.0812 [0.0805]
			Seed	0.0939	27	ND, ND [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]
Geneva, MN; 2011 (TK0040391-10)	5	S19-A6	Forage	0.0950	7	0.00950, 0.0141 [0.0118]	0.00870, 0.00990 [0.00930]	0.00422, 0.00495 0.00458	0.0224, 0.0290 [0.0257]
			Hay		7 (4)	0.446, 0.708 [0.577]	0.0181, 0.0216 [0.0198]	0.00945, 0.0116 0.0105	0.474, 0.741 [0.607]
			Seed	0.0921	27	<0.002, <0.002 [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]
Northwood, ND; 2011 (TK0040391-11)	5	7317090	Forage	0.0982	8	0.0458, 0.0433 [0.0446]	<0.002, <0.002 [<0.002]	<0.002, <0.002 [<0.002]	<0.0498, <0.0473 [<0.0486]
			Hay		8 (4)	0.107, 0.118 [0.112]	<0.002, <0.002 [<0.002]	0.00232, 0.00275 [0.00254]	<0.111, <0.123 [<0.117]
			Seed	0.0974	27	<0.002, <0.002 [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]
Cherry Grove, MN; 2011 (TK0040391-12)	5	S19-A6	Forage	0.102	6	0.0109, 0.0119 [0.0114]	0.00373, 0.00308 [0.00340]	0.00280, <0.002 [<0.00240]	0.0174, <0.0170 [<0.0172]
			Hay		6 (6)	0.247, 0.454 [0.350]	0.00555, 0.0104 [0.00798]	0.00489, 0.00880 [0.00684]	0.257, 0.473 [0.365]
			Seed	0.0962	28	ND, ND [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]
McVille, ND; 2011 (TK0040391-13)	5	7317090	Forage	0.0976	7	0.00805, 0.0116 [0.00982]	<0.002, <0.002 [<0.002]	ND, ND [<0.002]	<0.0120, <0.0156 [<0.0138]
			Hay		7 (10)	0.0400, 0.0408 [0.0404]	0.00225, 0.00259 [0.00242]	<0.002, <0.002 [<0.002]	<0.0442, <0.0454 [<0.0448]
			Seed	0.0971	28	<0.002, <0.002 [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]

TABLE C.3. Residue Data from Soybean Field Trials with Abamectin.

Trial ID (City, State; Year)	Zone	Soybean Variety	Commodity	Total Rate (lb ai/A)	PHI[1] (days)	Residues (ppm)[2] [Average]			
						Avermectin B_{1a}	8,9-Z Avermectin B_{1a}	Avermectin B_{1b}	Combined Residues[3]
Ellendale, MN; 2011 (TK0040391-14)	5	S19-A6	Forage	0.0914	7	0.123, 0.155 [0.139]	0.00306, 0.00354 [0.00330]	0.00315, 0.00275 [0.00295]	0.129, 0.161 [0.145]
			Hay		7 (6)	0.472, 0.404 [0.438]	0.00785, 0.00720 [0.00752]	0.00785, 0.00685 [0.00735]	0.488, 0.418 [0.453]
			Seed	0.0900	28	ND, ND [<0.002]	ND, ND [<0.002]	<0.002, ND [<0.002]	<0.006, <0.006 [<0.006]
Fitchburg, WI; 2011 (TK0040391-15)	5	S19-A6	Forage	0.0942	7	0.0468, 0.0650 [0.0559]	<0.002, <0.002 [<0.002]	<0.002, <0.002 [<0.002]	<0.0508, <0.0690 [<0.0599]
			Hay		7 (8)	0.198, 0.220 [0.209]	<0.002, 0.00224 [0.00212]	0.00362, 0.00424 [0.00393]	0.204, 0.226 [0.215]
			Seed	0.0945	28	ND, ND [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	0.006, 0.006 [<0.006]
Seymour, IL; 2011 (TK0040391-16)	5	S33-K5	Forage	0.0890	7	0.110, 0.0718 [0.0909]	0.00570, 0.00404 [0.00487]	0.00221, <0.002 [<0.00210]	0.118, <0.0778 [<0.0979]
			Hay		7 (4)	0.323, 0.362 [0.342]	0.0182, 0.0179 [0.0180]	0.00590, 0.00660 0.00625	0.347, 0.386 [0.366]
			Seed	0.0892	28	<0.002, <0.002 [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	0.006, 0.006 [<0.006]
Bellmore, IN; 2011 (TK0040391-17)	5	S33-K5	Forage	0.0870	7	0.0267, 0.0347 [0.0307]	<0.002, 0.00217 [0.00208]	<0.002, <0.002 [<0.002]	<0.0307, <0.0389 [<0.0348]
			Hay		7 (2)	0.129, 0.0995 [0.114]	0.00545, 0.00520 [0.00532]	0.00233, 0.00230 [0.00232]	0.137, 0.107 [0.122]
			Seed	0.0875	28	ND, <0.002 [0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]
Rice, MN; 2011 (TK0040391-18)	5	S08-M8	Forage	0.0842	7	0.0322, 0.0380 [0.0351]	<0.002, <0.002 [<0.002]	<0.002, <0.002 [<0.002]	<0.0362, <0.0420 [<0.0391]
			Hay		7 (3)	0.0615, 0.144 [0.103]	0.00234, 0.00595 [0.00414]	<0.002, 0.00341 [<0.00270]	<0.0658, 0.1534 [<0.110]
			Seed	0.0845	28	ND, ND [0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]

TABLE C.3. Residue Data from Soybean Field Trials with Abamectin.

Trial ID (City, State; Year)	Zone	Soybean Variety	Commodity	Total Rate (lb ai/A)	PHI[1] (days)	Residues (ppm)[2] [Average]			
						Avermectin B_{1a}	8,9-Z Avermectin B_{1a}	Avermectin B_{1b}	Combined Residues[3]
Richland, IA; 2011 (TK0040391-19)	5	S33-K5	Forage	0.0807	7	0.0209, 0.0198 [0.0204]	<0.002, <0.002 [<0.002]	<0.002, <0.002 [<0.002]	<0.0249, <0.0238 [<0.0244]
			Hay		7 (2)	0.0565, 0.0388 [0.04765]	0.00355, 0.0211 [0.0123]	<0.002, <0.002 [<0.002]	<0.0620 <0.0619 [<0.0620]
			Seed	0.0800	27	ND, ND [0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]
Bagley, IA; 2011 (TK0040391-20)	5	S33-K5	Forage	0.0776	6	0.0595, 0.0528 [0.0562]	<0.002, <0.002 [<0.002]	<0.002, <0.002 [<0.002]	<0.0635, <0.0568 [<0.0602]
			Hay		6 (5)	0.150, 0.206 [0.178]	0.00204, 0.00285 [0.00244]	0.00361, 0.00459 [0.00410]	0.156, 0.213 [0.185]
			Seed	0.0770	29	ND, <0.002 [0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]

[1] The number of days hay was allowed to dry prior to collection is reported in parenthesis.
[2] The LOQ was 0.002 ppm for each analyte in each soybean matrix; the LOD was not reported. ND = not detected (no observable chromatographic response) as reported by the petitioner; <0.002 ppm reflects detections below the LOQ. Per trial averages and combined residues were calculated by the study reviewer using the LOQ for values reported as <LOQ.
[3] Combined residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a}

TABLE C.4. Summary of Residue Data from Soybean Crop Field Trials with Abamectin.

Commodity	Analyte	Total Rate (lb ai/A)	PHI (days)	Residue Levels (ppm)[1]							
				n	Sample Min.	Sample Max.	LAFT[2]	HAFT[2]	Median	Mean	Std. Dev.
Forage	Avermectin B_{1a}	0.0776-0.127	6-8	20	0.00805	0.158	0.00982	0.152	0.033	0.053	0.047
	8,9-Z Avermectin B_{1a}			20	<0.002	0.00990	<0.002	0.00930	0.002	0.003	0.002
	Avermectin B_{1b}			20	<0.002	0.00495	<0.002	0.00458	0.002	0.002	0.001
	Combined Residues[3]			20	<0.0120	0.165	<0.0138	<0.158	0.037	0.059	0.047
Hay	Avermectin B_{1a}	0.0776-0.127	6-8	20	0.0358	0.708	0.0389	0.577	0.194	0.228	0.168
	8,9-Z Avermectin B_{1a}			20	<0.002	0.0216	<0.002	0.0198	0.006	0.007	0.006
	Avermectin B_{1b}			20	<0.002	0.0116	<0.002	0.0105	0.004	0.005	0.003
	Combined Residues[3]			20	<0.0420	0.741	<0.0448	0.607	0.200	0.240	0.174
Seed	Avermectin B_{1a}	0.0770-0.127	27-29	20	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	N/A
	8,9-Z Avermectin B_{1a}			20	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	N/A
	Avermectin B_{1b}			20	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	N/A
	Combined Residues[3]			20	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	N/A

[1] Except for sample min max, values reflect per trial averages; n = no. of field trials. N/A = Not Applicable.
[2] LAFT = lowest average field trial; HAFT = highest average field trial.

[1] Combined residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b}.

D. CONCLUSION

The submitted soybean field trial data are adequate. Following a combination of seed treatment with the 4.17 lb ai/gal FS formulation and two foliar broadcast applications of the 0.70 lb ai/gal SC formulation at total application rates of 0.077-0.127 lb ai/A, residues (and per trial averages) of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b}, respectively, in/on soybean forage and hay harvested at PHIs of 6-8 days were: 0.00805-0.158 (0.00983-0.152), <0.002-0.00990 (<0.002-0.00930), and <0.002-0.00495 (<0.002-0.00459) ppm in/on forage; and 0.0358-0.708 (0.0389-0.577), <0.002-0.0216 (<0.002-0.0199), and <0.002-0.0116 (<0.002-0.0105) ppm in/on hay. Residues of all three analytes were below the LOQ (<0.002 ppm) in/on soybean seed. Combined residues (and per trial averages) of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b} were <0.0121-0.165 (<0.0138-<0.158) ppm in/on forage, <0.0420-0.741 (<0.0448-0.607) ppm in/on hay, and <0.006 (<0.006) ppm in/on seed. The highest residues in hay were observed in the trial which received the highest second foliar application (Trial -10).

In the residue decline trials, combined residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b} generally decreased with increasing PHIs in/on soybean forage and hay. In one trial, however, residues in/on hay increased from the 1- to the 3-day PHI and declined thereafter. Residues of all analytes were below the LOQ (<0.002 ppm) in/on all samples of seed; therefore, residue decline could not be evaluated.

An acceptable method was used for residue quantitation, and adequate storage stability data are available to support sample storage intervals and conditions for all analytes.

E. REFERENCES

DP# 191433, G. J. Herndon, 5/19/94
49071012.der
49071016.der

F. DOCUMENT TRACKING

RDI: N. Dodd (5/15/14); RAB3 ChemTeam (5/15/14); S. Funk (5/15/14)
Petition Number: 3F8184
DP Barcode: 414022
PC Code: 122804

Primary Evaluator — Nancy Dodd, Chemist, RAB3/HED — Date: 5/15/14

Approved by — Steve Funk, Senior Chemist, RAB3/HED — Date: 5/15/14

Note: This Data Evaluation Record (DER) was originally prepared under contract by Versar, Inc. (6850 Versar Center, Springfield, VA 22151; submitted 12/20/13). The DER has been reviewed by HED and revised to reflect current Office of Pesticide Programs (OPP) policies.

STUDY REPORT:

49071010 Carringer, S. (2013) Abamectin 500 FS (A14006B) and Abamectin SC (A15368D) – Magnitude of the Residues in or on Soybean Resulting from Seed Treatment followed by Foliar Applications - USA, 2011. Report Number: TK0040391. Morse Study Number: 67391. SGS Study Number: G-1110BK. Unpublished study prepared by Syngenta Crop Protection, LLC. 621 p.

EXECUTIVE SUMMARY:

Syngenta CropScience, LLC has submitted a processing study with abamectin on soybean. Two trials were conducted during the 2011 growing season in Richland, IA and Bagley, IA reflecting a combination of seed treatment and two foliar applications of abamectin. A 4.17 lb ai/gal flowable concentrate for seed treatment (FS) formulation (Abamectin 500FS; A14006B) was applied to soybean seed before planting. The seed was treated at the SGS North America, Inc. facility (Brookings, SD) using commercial seed treatment procedures. Application rates of ~0.0413-0.0455 lb ai/A for seed treatment were based on approximate seeding rates and actual seed treatment rates. Treated seed was planted within 6-12 days of treatment. Each treated plot received two foliar broadcast applications of a 0.70 lb ai/gal suspension concentrate (SC) formulation (Abamectin SC: A15368D) at exaggerated rates of 0.0938-0.0949 lb ai/A/application (~5x the application rate used in the corresponding field trials). The first applications were made 96-81 days after planting, and the second foliar applications were made at retreatment intervals (RTIs) of 6 days. A nonionic surfactant (NIS) or crop oil concentrate (COC) was added to the foliar spray mixture for each trial. Total application rates including seed treatment were 0.231-0.234 lb ai/A.

Soybean seed was harvested at commercial maturity at preharvest intervals (PHIs) of 27-37 days and processed into aspirated grain fractions (AGF), meal, hulls, and refined-bleached deodorized oil using simulated commercial procedures. Processing was conducted by the GLP Technologies (Navasota, TX). Adequate descriptions were provided of the processing procedures, including material balance summaries.

Samples were analyzed for residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b} using a high performance liquid chromatography method with tandem mass spectrometric

detection (LC/MS/MS), Morse Analytical Method Meth-192/Revision #2. The limit of quantitation (LOQ; determined as the lowest level of method validation, LLMV) was 0.002 ppm for each analyte in each soybean matrix, for a combined LOQ of 0.006 ppm. The method was adequate for data collection based on acceptable concurrent recovery data. The fortification levels used in concurrent method recovery were adequate to bracket expected residue levels. Concurrent recoveries were corrected for apparent residues in controls; residues in the treated samples were not corrected for apparent residues in controls.

Samples of soybean seed were stored frozen after harvest for 2 days at the Richland, IA site and at ambient temperatures for 6 days at the Bagley, IA site, after which they were shipped frozen from the field sites to the processing facility, where they were stored frozen (<-10 °F) until processing. Processing took place within 232-276 days (7.6-9.1 months) of harvest. Samples were stored frozen (generally <-10 °F at the processing facility and -25 to -10 °C at the analytical laboratory) from harvest/processing to analysis for 339-351 days (11.1-11.5 months) for seed (RAC), 93-119 days (3.1-3.9 months) for AGF, and 47-79 days (1.5-2.6 months) for the processed commodities. Samples were analyzed within 1-4 days of extraction. Acceptable storage stability data are available demonstrating that residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} are stable under frozen storage conditions in/on cottonseed (avermectin B_{1a} only) for 14 months; in/on celery, tomato, and strawberries for 24 months; in/on oranges, lemons, and grapefruits for 29 months; and in/on pears for 35 months (DP# 191433, G. J. Herndon, 5/19/94). In addition, acceptable storage stability data have been submitted demonstrating that residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} are stable in/on corn and soybean meal and oil during frozen storage for up to 6 months (refer to 49071012.der). The available and submitted storage stability data are adequate to support the storage conditions and durations for samples of soybean processed commodities from the submitted crop field trial study.

Following a combination of seed treatment with the 4.17 lb ai/gal FS formulation and two foliar broadcast applications of the 0.70 lb ai/gal SC formulation at total application rates of 0.231-0.234 lb ai/A, residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b} were below the LOQ in/on all samples of soybean seed and refined oil from both trials and in all samples of processed commodities from the Richland, IA trial except AGF, in which average residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b}, and combined residues of the three analytes, respectively, were 0.193, 0.00332, 0.00256, and 0.198 ppm. In the Bagley, IA trial, residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b}, respectively, were: 0.496, 0.00456, 0.00635, ppm in/on AGF; <0.00233, <0.002, and <0.002 ppm in meal; and 0.00292, <0.002, and <0.002 ppm in hulls. Combined residues of the three analytes were 0.507, <0.00633, and <0.00692 ppm in/on AGF, meal, and hulls, respectively.

The processing data indicate that combined residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} may concentrate in/on AGF (average processing factor of 59x), meal (1.1x), and hulls (1.2x). For all other matrices, processing factors could not be calculated because residues were below the LOQ in both the RAC and processed commodities.

The observed processing factors are less than the theoretical concentration factor of 11.3x in soybean hulls, 2.2x in soybean meal, and 12x in soybean oil (based on separation into components; OCSPP 860.1520, Table 3).

STUDY/WAIVER ACCEPTABILITY/DEFICIENCIES/CLARIFICATIONS:

Under the conditions and parameters used in the study, the processed commodity residue data are classified as scientifically acceptable. The acceptability of this study for regulatory purposes is addressed in the forthcoming U.S. EPA Residue Chemistry Summary Document [DP# 414022].

COMPLIANCE:

Signed and dated Good Laboratory Practice (GLP), Quality Assurance, and Data Confidentiality statements were provided. No deviations from regulatory requirements were reported which would have an impact on the validity of the study.

A. BACKGROUND INFORMATION

Tolerances are established for the combined residues of avermectin B_1 [a mixture of avermectins containing ≥80% avermectin B_{1a} (5-*O*-demethyl avermectin A_1) and ≤20% avermectin B_{1b} (5-*O*-demethyl-25-de(1-methylpropyl)-25-(1-methylethyl) avermectin A_1)] and its delta-8,9-isomer. Abamectin is a natural fermentation product of the soil bacterium *Streptomyces avermitilis*. Abamectin is an insecticide/miticide used to control mites, leafminers, and other insects in commercially important crops, as a seed protectant against nematodes, and in veterinary medicine for treatment of internal and external parasites and mites.

The chemical structure and nomenclature of abamectin and the physicochemical properties of the technical grade of abamectin are presented in Tables A.1 and A.2.

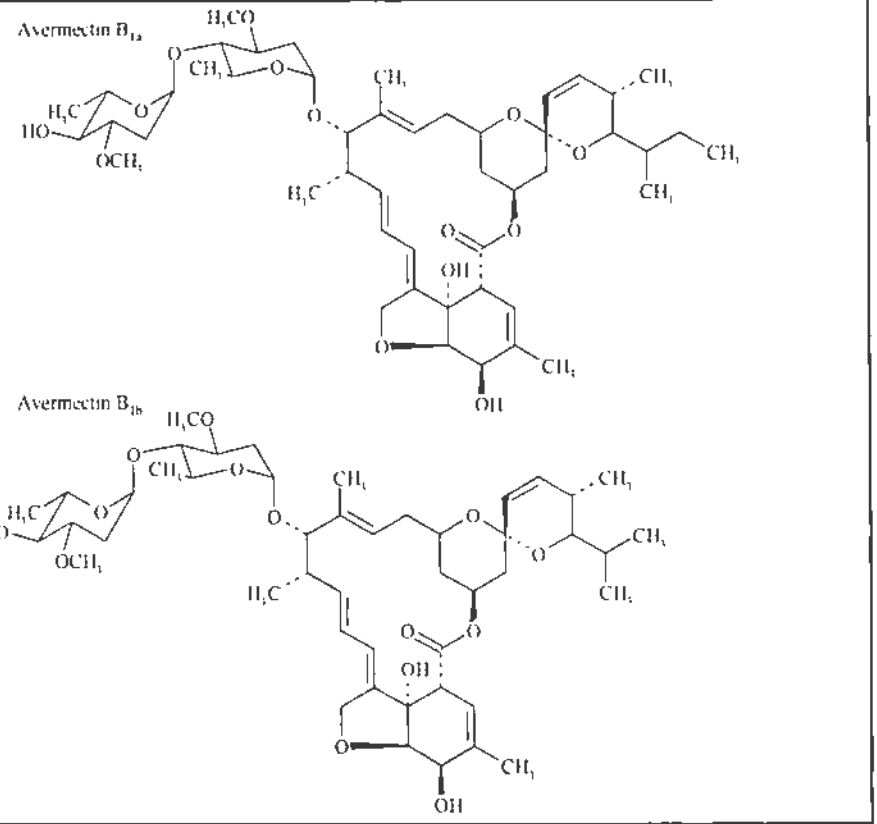
TABLE A.1. Test Compound Nomenclature.	
Compound	
Common name	Abamectin; Avermectin B_1
Company experimental name	MK0936
IUPAC name	mixture of ≥80% (10*E*,14*E*,16*E*)-(1*R*,4*S*,5'*S*,6*S*,6'*R*,8*R*,12*S*,13*S*,20*R*,21*R*,24*S*)-6'-[(*S*)-*sec*-butyl]-21,24-dihydroxy-5',11,13,22-tetramethyl-2-oxo-(3,7,19-trioxatetracyclo[15.6.1.1^{4,8}.0^{20,24}]pentacosa-10,14,16,22-tetraene)-6-spiro-2'-(5',6'-dihydro-2'*H*-pyran)-12-yl 2,6-dideoxy-4-*O*-(2,6-dideoxy-3-*O*-methyl-α-L-*arabino*-hexopyranosyl)-3-*O*-methyl-α-L-*arabino*-hexopyranoside and ≤20% (10*E*,14*E*,16*E*)-(1*R*,4*S*,5'*S*,6*S*,6'*R*,8*R*,12*S*,13*S*,20*R*,21*R*,24*S*)-21,24-dihydroxy-6'-isopropyl-5',11,13,22-tetramethyl-2-oxo-(3,7,19-trioxatetracyclo[15.6.1.1^{4,8}.0^{20,24}]pentacosa-10,14,16,22-tetraene)-6-spiro-2'-(5',6'-dihydro-2'*H*-pyran)-12-yl 2,6-dideoxy-4-*O*-(2,6-dideoxy-3-*O*-methyl-α-L-*arabino*-hexopyranosyl)-3-*O*-methyl-α-L-*arabino*-hexopyranoside
CAS name	Avermectin B_1
CAS registry number	71751-41-2
End-use product (EP)	4.17 lb ai/gal flowable concentrate for seed treatment (FS) formulation (Abamectin 500 FS; A14006B) 0.70 lb ai/gal suspension concentrate (SC) formulation (Abamectin SC; A15368D)

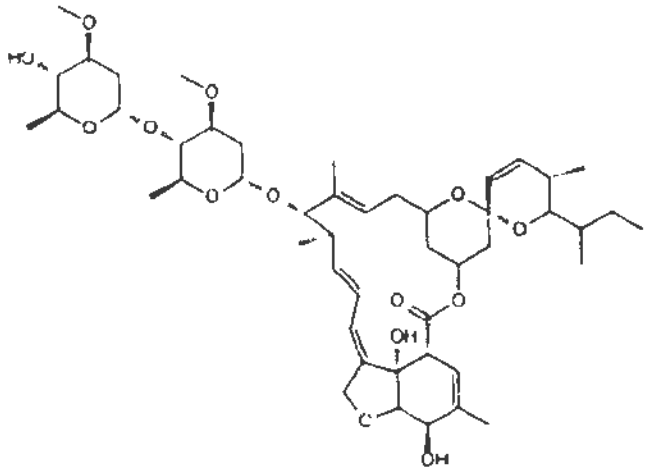
TABLE A.1. Test Compound Nomenclature.	
Compound	
Common name	8,9-Z Avermectin B_{1a}

TABLE A.2. Physicochemical Properties of the Technical Grade Test Compound Abamectin.		
Parameter	Value	Reference
Melting point/range	161.8-169.4°C (with thermal decomposition)	Study report (MRID 48758002)
pH	8-9 at 25°C	
Density	1.18×10^3 kg/m^3 at 22°C	
Water solubility at 25°C	1.21 µg/mL at pH 7.57	
Solubility in organic solvents	Acetone 72 g/L Dichloromethane 470 g/L Ethyl acetate 160 g/L Hexane 0.110 g/L Methanol 13 g/L Octanol 83 g/L Toluene 23 g/L	
Vapor pressure at 25°C	$<3.7 \times 10^{-9}$ Pa	
Dissociation constant (pK_a)	no dissociation constant in aqueous solution	
Octanol/water partition coefficient. Log P_{ow}	4.4 at pH 7.2	
UV/visible absorption spectrum	Absorbance maxima Neutral: 32,549 l/mol•cm at 245 nm 18,983 l mnl•cm at 255 nm Acidic: 34,515 l/mol•cm at 245 nm 20,977 l/mol•cm at 255 nm Basic: 29,551 l/mol•cm at 245 nm	

B. EXPERIMENTAL DESIGN

B.1. Application and Crop Information

Two trials were conducted during the 2011 growing season in Richland, IA and Bagley, IA reflecting a combination of seed treatment and two foliar applications of abamectin. A 4.17 lb

ai/gal flowable concentrate for seed treatment (FS) formulation (Abamectin 500FS; A14006B) was applied to soybean seed before planting. The seed was treated at the SGS North America, Inc. facility (Brookings, SD) using commercial seed treatment procedures. Application rates of ~0.0413-0.0455 lb ai/A for seed treatment were based on approximate seeding rates (~127,444-140,531 seed/A) and seed treatment rates (0.147 mg ai/seed). Treated seed was planted within 6-12 days of treatment. Each treated plot received two foliar broadcast applications of a 0.70 lb ai/gal suspension concentrate (SC) formulation (Abamectin SC; A15368D) at exaggerated rates of 0.0938-0.0949 lb ai/A/application (~5x the application rate used in the corresponding field trials). The first applications were made 96-81 days after planting, and the second foliar applications were made at RTIs of 6 days. A nonionic surfactant (NIS) or crop oil concentrate (COC) was added to the foliar spray mixture for each trial. Total application rates including seed treatment were 0.231-0.234 lb ai/A. Soybean seed was harvested at commercial maturity at PHIs of 27-37 days.

Study use pattern data are reported in Table B.1.

TABLE B.1. Study Use Pattern.

Location (City, State; Year) Trial ID	EP [1]	Application					Tank Mix/ Adjuvants[5]
		Method/Timing[2]	Volume (gal/A)	Rate[3] (lb ai/A)	RTI[4] (days)	Total Rate[3] (lb ai/A)	
Richland, IA; 2011 (TK0040391 -19)	4.17 lb ai/gal FS	1. Seed treatment; 12 days after planting	--	0.0413	--	0.231	--
	0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 79 (~ all pods have reached final length,15-20 mm, seeds filling the cavity of majority of pods)	19	0.0949	96		NIS
		3. Foliar broadcast; BBCH 80 (first pods ripe, beans final color, dry and hard beginning of ripening)	19	0.0948	6		NIS
Bagley, IA;2011 (TK0040391 -20)	4.17 lb ai/gal FS	1. Seed treatment; 6 days after planting	--	0.0455	--	0.234	--
	0.70 lb ai/gal SC	2. Foliar broadcast; BBCH 71	7.6	0.0938	81		COC
		3. Foliar broadcast; BBCH 73	9.4	0.0943	6		COC

[1] EP = End-use Product: 4.17 lb ai/gal flowable concentrate for seed treatment (FS) formulation (Abamectin 500 FS; A14006B) and 0.70 lb ai/gal suspension concentrate (SC) formulation (Abamectin SC; A15368D).
[2] Days before planting = no. of days from seed treatment to planting.
[3] Application rates in lb ai/A for seed treatment were based on approximate seeding rates (seed/A) and actual seed treatment rates (mg ai/seed). Total rate = sum of seed treatment and two foliar applications.
[4] RTI = Retreatment interval (days after planting for interval between seed treatment and first foliar application).
[5] NIS = nonionic surfactant. COC = crop oil concentrate.

B.2. Sample Handling and Processing Procedures

Single control and treated bulk samples of soybean seed (≥544 kg) were collected from each plot at commercial maturity 27-37 days after the last foliar application of abamectin. The bulk seed samples were placed in frozen storage within 3 hours of harvest and were held frozen at the Richland, IA site or were held at ambient temperatures for 6 days at the Bagley, IA site after which they were shipped via ACDS freezer truck to the processing laboratory, GLP

Technologies (Navasota, Texas), where they were stored frozen (≤-10 °F) until processing into AGF, meal, hulls, and refined-bleached-deodorized oil.

Prior to processing, subsamples of soybean seed were collected, aspirated grain fractions were generated, and the soybean seed samples was were processed into meal, hulls, and oil using methodology and equipment that simulated commercial practice. Processing of soybean seed commenced 230-262 days after harvest. Processing was completed within 232-276 days (7.6-9.1 months) of harvest, and the samples were returned to frozen storage for up to 3-16 days prior to shipment to the analytical laboratory, Morse Laboratories, LLC (Sacramento, CA), where they were stored frozen (-25 to -10 °C) until analysis. In preparation for analysis, samples of soybean seed and hulls were homogenized using a grinder in the presence of dry ice. No further processing of the soybean meal, oil or aspirated grain fractions was necessary. All samples remained frozen except during homogenization and subsampling for analysis.

The processing procedures simulated commercial operations of soybean production as closely as possible to generate the required fraction of soybean seed (RAC) and the processed fractions, with some variations to commercial methods. Adequate descriptions of the processing procedures were provided, including material balance summaries. Processing flowcharts for soybean AGF and processed fractions, copied without alteration from MRID 49071010, are presented in Figures B.2.1 and B.2.2, respectively.

FIGURE B.2.1. Processing Flowchart for Soybean Aspirated Grain Fractions.

Sample No. 2 (Treated, Trt. 4) Field Sample No.: 011

COMMODITY 1422.3 lbs.

Drying N/A lbs. (After drying)

1422.3 lbs. used for generation

Aspiration 0.5 lbs.

Classification

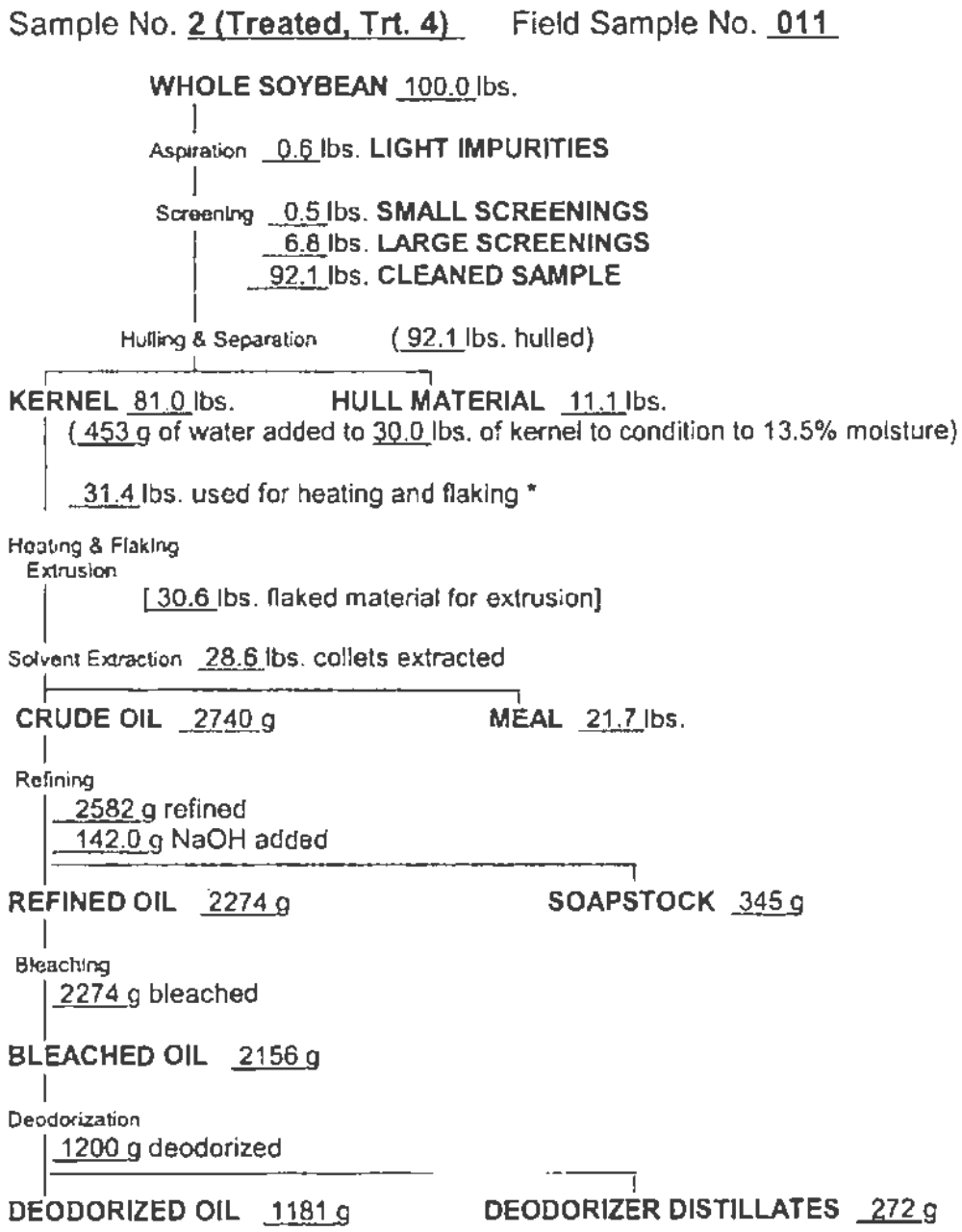
- **ASPIRATED GRAIN FRACTION > 2360 micron** 235.9 g
- **ASPIRATED GRAIN FRACTION > 2000 micron** 2.0 g
- **ASPIRATED GRAIN FRACTION > 1180 micron** 2.1 g
- **ASPIRATED GRAIN FRACTION > 850 micron** 0.2 g
- **ASPIRATED GRAIN FRACTION > 425 micron** 0.3 g
- **ASPIRATED GRAIN FRACTION < 425 micron** 16.9 g

Amounts recombined for **ASPIRATED GRAIN FRACTION**:

2.0 g < 2360 micron and > 2000 micron
2.1 g > 1180 micron
0.2 g > 850 micron
0.2 g > 425 micron
16.9 g < 425 micron

ASH CONTENT: 12.43 %

FIGURE B.2.2. Processing Flowchart for Soybean Seed.



B.3. Analytical Methodology

Samples were analyzed using Morse Labs Method Meth-192/Revision #2, entitled "Determination of Abamectin Residues in Fruits and Vegetables (Raw Agricultural Commodity)

by LC-MS/MS" with slight modifications. A description of the method including details of modifications was included in the submission.

Briefly, residues of avermectin B1a, avermectin B1b, and avermectin B1a, 9-Z isomer were extracted from homogenized crop samples with acetonitrile:1% phosphoric acid (25:75, v:v). Samples of soybean seed were allowed to soak in the extraction solvent for 10-15 minutes prior to homogenization. Residues were then partitioned into hexane. An aliquot of the extract was purified on an aminopropyl solid phase extraction (SPE) column. The purified extract was evaporated to dryness and redissolved in acetonitrile for LC/MS/MS analysis.

The LOQ (determined as the LLMV) was 0.002 ppm for each analyte in each soybean matrix, for a combined LOQ of 0.006 ppm; the limit of detection (LOD) was not reported.

C. RESULTS AND DISCUSSION

Sample storage conditions and durations are reported in Table C.2. Samples of soybean seed were stored frozen after harvest for 2 days at the Richland, IA site and at ambient temperatures for 6 days at the Bagley, IA site, after which they were shipped frozen from the field sites to the processing facility, where they were stored frozen (<-10 °F) until processing. Processing took place within 232-276 days (7.6-9.1 months) of harvest. Samples were stored frozen (generally <-10 °F at the processing facility and -25 to -10 °C at the analytical laboratory) from harvest/processing to analysis for 339-351 days (11.1-11.5 months) for seed (RAC), 93-119 days (3.1-3.9 months) for AGF, and 47-79 days (1.5-2.6 months) for the processed commodities. Samples were analyzed within 1-4 days of extraction. Acceptable storage stability data are available demonstrating that residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} are stable under frozen storage conditions in/on cottonseed (avermectin B_{1a} only) for 14 months; in/on celery, tomato, and strawberries for 24 months; in/on oranges, lemons, and grapefruits for 29 months; and in/on pears for 35 months (DP# 191433, G. J. Herndon, 5/19/94). In addition, acceptable storage stability data have been submitted demonstrating that residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} are stable in/on corn and soybean meal and oil during frozen storage for up to 6 months (refer to 49071012.der). The available and submitted storage stability data are adequate to support the storage conditions and durations for samples of soybean processed commodities from the submitted crop field trial study.

Method validation and concurrent method recovery data for the LC/MS/MS method are presented in Table C.1. For method validation, samples of soybean seed, meal, and refined oil were fortified with avermectin B_{1a} at 0.002-3.36 ppm. Samples of soybean seed, meal and refined oil were fortified with avermectin B_{1b} and 8,9-Z avermectin B_{1a} at 0.002-0.20 ppm. For concurrent method recovery, soybean seed samples were fortified with avermectin B_{1a} at 0.002 ppm and with avermectin B_{1b} and 8,9-Z avermectin B_{1a} at 0.002 - 0.20 ppm each. Soybean AGF were fortified with avermectin B_{1a} at 0.002-0.839 ppm, with avermectin B_{1b} at 0.002 - 0.05 ppm, and with 8,9-Z avermectin B_{1a} at 0.002-0.20 ppm. Soybean meals, hulls, and refined oil were fortified with avermectin B_{1a} at 0.002-0.0336 ppm, with avermectin B_{1b} at 0.002 ppm, and with 8,9-Z avermectin B_{1a} at 0.002-0.20 ppm. The method was adequate for data collection based on

acceptable concurrent recovery data. Recoveries were generally within the acceptable range of 70-120%, with a few low recoveries. The fortification levels used in concurrent method recovery were adequate to bracket expected residue levels. Apparent residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} were below the LOQ in/on all samples of untreated soybean seed, aspirated grain fractions, and processed commodities, except for one aspirated grain fraction sample (0.00320 ppm from the Bagley, IA site). Concurrent recoveries were corrected for apparent residues in controls; residues in the treated samples were not corrected for apparent residues in controls.

Residue data from the soybean processing study are reported in Table C.3. Following a combination of seed treatment with the 4.17 lb ai/gal FS formulation and two foliar broadcast applications of the 0.70 lb ai/gal SC formulation at total application rates of 0.231-0.234 lb ai/A, residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b} were below the LOQ in/on all samples of soybean seed and refined oil from both trials and in all samples of processed commodities from the Richland, IA trial except AGF, in which average residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b}, and combined residues of the three analytes, respectively, were 0.193, 0.00332, 0.00256, and 0.198 ppm. In the Bagley, IA trial, residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b}, respectively, were: 0.496, 0.00456, 0.00635, ppm in/on AGF; <0.00233, <0.002, and <0.002 ppm in meal; and 0.00292, <0.002, and <0.002 ppm in hulls. Combined residues of the three analytes were 0.507, <0.00633, and <0.00692 ppm in/on AGF, meal, and hulls, respectively.

The processing data indicate that combined residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} may concentrate in/on AGF (average processing factor of 59x), meal (1.1x), and hulls (1.2x). For all other matrices, processing factors could not be calculated because residues were below the LOQ in both the RAC and processed commodities.

The observed processing factors are less than the theoretical concentration factor of 11.3x in soybean hulls, 2.2x in soybean meal, and 12x in soybean oil (based on separation into components; OCSPP 860.1520, Table 3).

TABLE C.1. Summary of Method Validation and Concurrent Recoveries of Abamectin from Soybean Matrices.

Matrix	Analyte	Spike Level (ppm)	Sample Size (n)	Recoveries (%)[1]	Mean ± Std. Dev. (%)[2]
Method Validation					
Soybean seed [3]	Avermectin B_{1a}	0.002	3	98, 85, 66	83±16
		0.0336	3	81, 71, 94	82±12
		3.36	3	71, 73, 79	74±4.2
	Avermectin B_{1b}	0.002	3	109, 118, 86	104±17
		0.20	3	82, 70, 82	78±6.9
	Avermectin B_{1a}, 8,9-Z isomer	0.002	3	93, 77, 111	94±17
		0.20	3	91, 94, 93	93±1.5
Soybean meal	Avermectin B_{1a}	0.002	3	70, 76, 79	75±4.6

TABLE C.1. Summary of Method Validation and Concurrent Recoveries of Abamectin from Soybean Matrices.

Matrix	Analyte	Spike Level (ppm)	Sample Size (n)	Recoveries (%)[1]	Mean ± Std. Dev. (%)[2]
		0.0336	3	65, 66, 77	69±6.7
		3.36	3	70, 77, 88	78±9.1
	Avermectin B_{1b}	0.002	3	63, 72,85	73±11
		0.20	3	62, 66, 77	68±7.8
	Avermectin B_{1a}, 8,9-Z isomer	0.002	3	62, 73, 73	69±6.4
		0.20	3	86, 87, 100	91±7.8
Soybean oil	Avermectin B_{1a}	0.002	3	69, 70, 73	71±2.1
		0.0336	3	82, 85, 89	85±3.5
		3.36	3	98, 104, 105	102±3.8
	Avermectin B_{1b}	0.002	3	75, 76, 78	76±1.5
		0.20	3	92, 94, 98	95±3.1
	Avermectin B_{1a}, 8,9-Z isomer	0.002	3	66, 67, 73	69±3.8
		0.20	3	94, 106, 107	102±7.2
Concurrent Recovery					
Soybean seed[3]	Avermectin B_{1a}	0.002	2	62, 93	78
	Avermectin B_{1b}	0.002	2	67, 96	82
		0.20	2	64, 83	74
	Avermectin B_{1a}, 8,9-Z isomer	0.002	2	69, 82	76
		0.20	2	73, 101	87
Soybean, AGF	Avermectin B_{1a}	0.002	1	83	83
		0.0336	1	86	86
		0.839	1	99	99
	Avermectin B_{1b}	0.002	1	60	60
		0.05	1	68	68
	Avermectin B_{1a}, 8,9-Z isomer	0.002	1	69	69
		0.20	1	107	107
Soybean meal	Avermectin B_{1a}	0.002	1	89	89
		0.0336	1	73	73
	Avermectin B_{1b}	0.002	1	85	85
	Avermectin B_{1a}, 8,9-Z isomer	0.002	1	99	99
		0.20	1	93	93
Soybean hulls	Avermectin B_{1a}	0.002	2	65, 77	71
		0.0336	2	81, 83	82
	Avermectin B_{1b}	0.002	2	65, 94	80
	Avermectin B_{1a}, 8,9-Z isomer	0.002	2	86, 95	90
		0.20	2	86, 97	92
Soybean oil	Avermectin B_{1a}	0.002	2	105, 117	111
		0.0336	2	96, 115	106
	Avermectin B_{1b}	0.002	2	74, 106	90
	Avermectin B_{1a}, 8,9-Z isomer	0.002	2	85, 90	88
		0.20	2	97, 101	99

[1] Concurrent recoveries were corrected for apparent residues in control samples.

[2] Standard deviations are calculated only for fortification levels having ≥3 samples.
[3] Recoveries for soybean seed are also reported in the crop field trial DER for MRID 49071010.

TABLE C.2. Summary of Storage Conditions.

Matrix	Storage Temperature (°C)	Actual Storage Duration[1]	Limit of Demonstrated Storage Stability
Soybean seed (RAC)	Frozen at field sites: -25 to -10 at analytical laboratory	339-351 (11.1-11.5)	Acceptable storage stability data are available demonstrating that residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} are stable under frozen storage conditions in/on cottonseed (avermectin B_{1a} only) for 14 months; in/on celery, tomato, and strawberries for 24 months; in/on oranges, lemons, and grapefruits for 29 months; and in/on pears for 35 months (DP# 191433, G. J. Herndon, 5/19/94). In addition, acceptable storage stability data have been submitted demonstrating that residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} are stable in corn and soybean meal and oil during frozen storage for up to 6 months (refer to 49071012.der).
AGF		93-119 (3.1-3.9)	
Meal		51-79 (1.7-2.6)	
Hulls		57-66 (1.9-2.2)	
Refined oil		47-63 (1.5-2.1)	

[1] Interval from harvest/processing to analysis. Samples were analyzed within 1-4 days of extraction.

TABLE C.3. Residue Data from Soybean Processing Study with Abamectin.

RAC	Processed Commodity	Total Rate (lb ai/A)	PHI (days)	Residues[1] (ppm) [Average]				Processing Factor[3]			
				Avermectin B_{1a}	8,9-Z Avermectin B_{1a}	Avermectin B_{1b}	Combined Residues[2]	Avermectin B_{1a}	8,9-Z Avermectin B_{1a}	Avermectin B_{1b}	Combined Residues[2]
Richland, IA; 2011 (TK0040391-19)											
Soybean	Seed (RAC)	0.231	27	<0.002, <0.002, <0.002 [<0.002]	ND, ND, ND [<0.002]	ND, ND, ND [<0.002]	<0.006, <0.006, <0.006 [<0.006]	--	--	--	--
	AGF			0.196, 0.189 [0.192]	0.00344, 0.00320 [0.00332]	0.00246, 0.00266 [0.00256]	0.202, 0.195 [0.198]	96	1.7	1.3	33
	Meal			<0.002, ND [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]	NC[4]	NC	NC	NC
	Hulls			<0.002, <0.002 [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]	NC	NC	NC	NC
	Refined oil			ND, ND [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]	NC	NC	NC	NC
Bagley, IA;2011 (TK0040391-20)											
Soybean	Seed (RAC)	0.234	37	<0.002, <0.002, <0.002 [<0.002]	ND, ND, ND [<0.002]	ND, ND, ND [<0.002]	<0.006, <0.006, <0.006 [<0.006]	--	--	--	--
	AGF			0.498, 0.494 [0.496]	0.00492, 0.00420 [0.00456]	0.00615, 0.00655 [0.00635]	0.509, 0.505 [0.507]	248	2.3	3.2	84.5
	Meal			ND, 0.00265 [<0.00232]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.00665 [0.00632]	1.2	NC	NC	1.1
	Hulls			0.00281, 0.00302 [0.00292]	ND, ND [<0.002]	ND, ND [<0.002]	<0.00681, 0.00702 [0.00692]	1.5	NC	NC	1.2
	Refined oil			ND, ND [<0.002]	ND, ND [<0.002]	ND, ND [<0.002]	<0.006, <0.006 [<0.006]	NC	NC	NC	NC

TABLE C.3. Residue Data from Soybean Processing Study with Abamectin.

RAC	Processed Commodity	Total Rate (lb ai/A)	PHI (days)	Residues[1] (ppm) [Average]				Processing Factor[3]			
				Avermectin B_{1a}	8,9-Z Avermectin B_{1a}	Avermectin B_{1b}	Combined Residues[2]	Avermectin B_{1a}	8,9-Z Avermectin B_{1a}	Avermectin B_{1b}	Combined Residues[2]
Average Processing Factors (for Trials TK0040391-19 and TK0040391-20)											
Soybean	Seed (RAC)							--	--	--	--
	AGP							172	2.0	2.2	59
	Meal							1.2	NC	NC	1.1
	Hulls							1.5	NC	NC	1.2
	Refined oil							NC	NC	NC	NC

[1] The LOQ was 0.002 ppm for each analyte in each corn matrix; the LOD was not reported. <0.002 ppm represents values <LOQ. ND = not detected (no observable chromatographic response) as reported by the petitioner. Average residues and combined residues were calculated by the study reviewer using the LOQ for values reported as <LOQ.

[2] Combined residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a}.

[3] Processing Factor = [Measured residue for analyte in the processed fraction] / [Measured residue for analyte in the grain RAC].

[4] NC Not calculated; residues were below the LOQ in both the RAC and processed fraction.

D. CONCLUSION

The submitted soybean processing study is acceptable. Following a combination of seed treatment with the 4.17 lb ai/gal FS formulation and two foliar broadcast applications of the 0.70 lb ai/gal SC formulation at total application rates of 0.231-0.234 lb ai/A, residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b} were below the LOQ in/on all samples of soybean seed and refined oil from both trials and in all samples of processed commodities from the Richland, IA trial except AGF, in which average residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b}, and combined residues of the three analytes, respectively, were 0.193, 0.00332, 0.00256, and 0.198 ppm. In the Bagley, IA trial, residues of avermectin B_{1a}, 8,9-Z avermectin B_{1a}, and avermectin B_{1b}, respectively, were: 0.496, 0.00456, 0.00635, ppm in/on AGF; <0.00233, <0.002, and <0.002 ppm in meal; and 0.00292, <0.002, and <0.002 ppm in hulls. Combined residues of the three analytes were 0.507, <0.00633, and <0.00692 ppm in/on AGF, meal, and hulls, respectively.

The processing data indicate that combined residues of avermectin B_{1a}, avermectin B_{1b}, and 8,9-Z avermectin B_{1a} may concentrate in/on AGF (average processing factor of 59x), meal (1.1x), and hulls (1.2x). For all other matrices, processing factors could not be calculated because residues were below the LOQ in both the RAC and processed commodities.

An acceptable method was used for residue quantitation, and adequate storage stability data are available to support sample storage intervals and conditions for all analytes.

E. REFERENCES

DP# 191433, G. J. Herndon, 5/19/94
49071012.der

F. DOCUMENT TRACKING

RDI: N. Dodd (5/15/14); RAB3 ChemTeam (5/15/14); S. Funk (5/15/14)
Petition Number: 3F8184
DP Barcode: 414022
PC Code: 122804